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(54) ORGANIC REACTION USING SOLID ACID CATALYST

(57) Abstract:

PURPOSE: To carry out an organic reaction such as esterification, hydration, hydrolysis, etc. using a solid acid catalyst in a short time in high yield, by bringing a reaction raw material into contact with a solid acid catalyst first so that a liquid-phase reaction not followed by distillation is done, subjecting it to a gas-liquid phase reaction followed by distillation in the presence of a solid acid catalyst.

CONSTITUTION: In carrying out an organic reaction using a solid acid catalyst, all or part of a reaction raw material is brought into contact with a solid acid catalyst (preferably strongly acidic cation exchange resin having 21mm particle size in spherical or crushed state, or highly acidic cation exchange fiber having 2100μ diameter) to do a gaseous-phase reactic not followed by distillation during the reaction. Th reaction raw material after the liquid-phase reaction i subjected to a gas-liquid phase reaction followed b distillation during the reaction in the presence of solid acid catalyst (preferably strongly acidic catio exchange fiber having 2100μ diameter). When th residue of the reaction raw material remains, it i brought into contact with part of the raw material c the liquid-phase reaction by the latter gas-liquid phas reaction in counter flow to carry out the organic reaction.

EFFECT: Merits are shown by combination of bot means.

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Detailed Description of the Invention

Although there exist various solid acid catalysts of silica-alumina compounds such as Zeolite, heteropoly acids, strongly acidic ion exchange resins and the like, if the catalysts are used in a system containing water, the catalysts, except for the strongly acidic ion exchange resins, cause drastic lowering of activity or dissolution and, therefore, strongly acidic cation exchange resins are mainly employed as the solid acid catalysts to be used in the water-containing system.

The lowering of activity of a catalyst occurs through various causes and where it is due to the irreversible chemical change or the physical destruction of the catalyst, reactivation is impossible. But, where the function as an acid of the catalyst is lowered by an alkali component or metallic ion or where the contact of the starting reaction material with the catalyst is prevented by the contamination of the catalyst surface with by-products of the reaction, the activity can be recovered.

The gist of the present invention exists in an organic reaction process by the use of a solid acid catalyst, characterized by effecting first a liquid phase reaction of the whole or a part of a starting reaction material under the catalysis with a solid acid catalyst without accompanying

distillation during the reaction and then effecting a gas-liquid phase reaction of the thus reacted starting reaction material in the presence of a solid catalyst with accompanying distillation during the reaction, and, if a remaining portion of the starting reaction material exists, effecting the counter flow contact of the remaining portion in the latter gas-liquid phase reaction.

Chemical Engineering Developments 15

Catalyst Design

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6-4-1 Case Where Deterioration Factor Is Carried in fro Reactant Side

1) Poisoning of Poisonous Substances in Reactan

Catalytic reactions proceed through the adsorption of a reactant onto the catalyst surface. Therefore, if a co-existing substance is contained in a starting material in addition to the subject reactant and t co-existing substance is one which causes a strong interaction with the active points of the catalyst, the co-existing substance which is inactive to the reaction preferentially covers completely the active points to prever the subject reaction from proceeding. This is called as poisoning of a catalyst.

Solid acid catalysts such as silica-alumina and Zeolitehave acid points as the active points and, therefore, are poisoned by a basic substance.
